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A STUDY OF THE MAMMALIAN GENUS CHILONYCTERIS.

BY JAMES A. G. REHN.

The following paper is the result of a study of an exceedingly interesting series of one hundred and three specimens, of which twenty-four were preserved as skins, the remainder being in alcohol. Of this representation forty-three were from the collection of the United States National Museum, thirty-six from that of the Biological Survey, eighteen from the American Museum of Natural History, and a small but exceedingly important series from the collection of the Academy.

The author wishes to express his indebtedness to Mr. Gerrit S. Miller, Jr., of the United States National Museum, Dr. C. Hart Merriam, of the Biological Survey, and Dr. J. A. Allen of the American Museum of Natural History, for their kindness in securing and permitting the use of specimens from the collections under their charge.

CHILONYCTERIS Gray.

- 1839. *Chilonycteris* Gray, Ann. Nat. Hist., IV, p. 4. September, 1839.
Type—*Chilonycteris MacLeayii* Gray.
- 1840. *Chilonycteris* Wagner, Suppl. Schreber's Säugthiere, I, p. 448.
- 1840. *Lobostoma* Gundlach, Archiv für Naturgeschichte, VI, bd. I, p. 357.
[Part.]
- 1843. *Chilonycteris* Wagner, Archiv für Naturgeschichte, IX, bd. I, p. 367.
[Part.]
- 1843. *Chilonycteris* Gray, Proc. Zoöl. Soc. London, 1843, p. 20.
- 1843. *Phyllodia* Gray, Proc. Zoöl. Soc. London, 1843, p. 50. Type—*Phyllodia parnellii* Gray.
- 1850. *Chilonycteris* Wagner, Abhandlungen Mathem.-Physik. Cl. Akad. Wissenschaften, München, V, p. 179. [Part.]
- 1851. *Chilonycteris* Gosse, Naturalist's Sojourn in Jamaica, p. 326.
- 1854. *Chilonycteris* Burmeister, Thiere Brasiliens, I, p. 74. [Part.]
- 1855. *Chilonycteris* Wagner, Suppl. Schreber's Säugthiere, V, p. 677. [Part.]
- 1861. *Chilonycteris* Gundlach, Monatsber. K. Preuss. Akad. Wissensch., Berlin, 1861, p. 154.
- 1861. *Chilonycteris* Tomes, Proc. Zoöl. Soc. London, 1861, p. 65.
- 1872. *Chilonycteris* Peters, Monatsber. K. Preuss. Akad. Wissensch., Berlin, 1872, p. 359.
- 1878. *Chilonycteris* Dobson, Catal. Chiropt. Brit. Mus., p. 447. [Part.]
- 1879. *Chilonycteris* Alston, Biol. Cent.-Amer., Mamm., p. 34. [Part.]
- 1880. *Chilonycteris* Dobson, Rep. Brit. Asso. Adv. Soc., 1880, p. 195.
- 1894. *Chilonycteris* J. A. Allen, Bull. Amer. Mus. Nat. Hist., VI, p. 247.
- 1902. *Chilonycteris* Miller, Proc. Acad. Nat. Sci. Phila., 1902, p. 400.

Generic Characters.—Crown of the head moderately elevated above the face line; ears separate, lateral; rostrum moderately depressed; nostrils superiorly with a more or less distinctly developed cutaneous

ridge; lower jaw with two transverse chin-lappets. Skull with the brain-case moderately elevated above the rostrum, and with basi-cranial axis but slightly raised from the facial axis. Dentition i. $\frac{2-2}{2-2}$, c. $\frac{1-1}{1-1}$, p. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

History.—The genus *Chilonycteris* was founded by Gray in 1839 on the Cuban *C. macleayii*, the describer believing the genus to be intermediate between “the Saccopteri and the genus *Mormoops*,” the latter genus being considered by him a member of the tribe *Noctilionina*. In 1840, Gundlach described the genus *Lobostoma* based on two species, one of which is the Cuban representative of the genus *Mormoops*, the other a synonym of *Chilonycteris macleayii*. The same year Wagner, in the first supplementary volume of the *Säugthiere*, associated the genus with *Mormoops*, and placed them in the tribe *Brachyura* of the *Gymnorhina*. During the year 1843 this genus received considerable attention from Wagner and Gray, the former of whom described *C. personata*, *C. rubiginosa* and *C. gymnonotus*, all from Natterer's Brazilian material. The last of these three species has since been removed to *Dermonotus* (= *Pteronotus* auct.). Gray's work consisted of the description of the Haitian *C. fuliginosa* and *Phyllodia parnellii* from Jamaica, the rather different character of the latter form having impressed him to such an extent that he created a genus for it. In commenting on *Phyllodia* he says it is “a Noctilionine bat, with an apparent nose-leaf, bearing a much greater resemblance to the Leaf-nosed Bats (*Phyllostomina*) than even *Mormoops*, which, when he first described it, Dr. Leach referred to that group.” The Jamaican *C. grisea* was the next form described, Gosse also giving us a figure. Burmeister, in 1854, in his system of Brazilian mammals, associated *Chilonycteris* and *Dysopes*, and placed them in the *Gymnura*; while Wagner, in 1855, placed it and *Mormoops* with the Noctilionine bats in the section *Brachyura* of the *Gymnorhina*. The year 1861 witnessed the description of two more species of the genus, *C. boothi* from Cuba by Gundlach, and *C. osburni* by Tomes from Jamaica, the latter being Gray's *Phyllodia parnellii*. Koch in 1862–63¹ used the term *Mormopida* in an indefinite way, apparently for this association of genera; while Gray, in 1866,² used the term *Mormopsina* for *Mormoops*, and *Phyllo-diana* for *Phyllodia*, *Chilonycteris* and *Pteronotus*. Peters, in his synopsis of the *Mormopidae*, published in 1872, associated *Chilonycteris* with *Mormops* in the above group. Gill, in the same year,³ proposed

¹ *Jahrb. Ver. Naturkunde Nassau*, Wiesbaden, XVII–XVIII, p. 358.

² *Ann. and Mag. Nat. Hist.*, XVII, p. 93.

³ *Arrangement of the Families of Mammals*, p. 16.

the family name *Mormopidae*. Dobson, in his historic catalogue, considered *Chilonycteris* and *Mormops* to comprise the group *Mormopes*, which is coextensive with his subfamily *Lobostominae*. The same author also describes the peculiar *C. psilotis* from an unknown locality. In 1892, Harrison Allen⁴ raised Dobson's *Lobostominae* to family rank, the *Lobostomidae*. In 1902, Miller separated the Mexican type of the *rubiginosa* group as *C. mexicana*, and distinguished a Porto Rican representative of the *boothi* group as *portoricensis*. While treating the genus *Mormoops*, the author, in the same year, considered *Mormoops*, *Chilonycteris* and *Dermonotus* representatives of a subfamily, for which the name *Mormoopinæ* was used.

General Relations.—The general relationship of the genus *Chilonycteris* to the other members of the *Mormoopinæ* has already been considered.⁵ Of the species in the genus the *boothi* and *rubiginosa* groups present the greatest superficial resemblance to *Mormoops*, particularly in the broad flattened head and the general form of the chin-lappets; but that these resemblances are not supported by other characters is evident on studying the skulls and structure of the ears and head appendages. On the other hand, the relationship of *C. psilotis* with *Dermonotus* is evident from the structure of the skull, while the *rubiginosa* group is seen to possess a skull having the same general characteristics. The arrangement of species in the following portion of this paper is in accordance with the general characters exhibited by the skull, running from the slender arched type of *C. macleayii* to the heavy short depressed skull of *C. psilotis*. There are several objections to such an arrangement, but there appears to be no good evidence to support any other classification. Dobson's *psilotis* is no doubt the most aberrant member of the genus, and, while in some tooth characters it appears to differ from all the other species, and also from *Dermonotus*, its position in the genus is easily found by the shape of the skull. Wagner's *personata* I have not seen, and probably it is closer to *psilotis* than my treatment would lead one to suppose. This point can, of course, only be settled by the examination of the specimens in the Vienna and Berlin Museums, or by the acquisition of further material.

Remarks.—Probably the most striking fact noticed on examining a large series of specimens of this genus is the presence of two well-marked color phases, one rufous, the other dark brown. This dichromatism is evident in every form of which an extensive series is

⁴ *Proc. U. S. Nat. Mus.*, XV, p. 437.

⁵ *Proc. Acad. Nat. Sci. Phila.*, 1902, p. 161.

available. The two extremes are sometimes connected by a series of intermediate individuals possessing to a greater or less degree the dull rather purplish-brown of one type and the rich golden rufous or warm red-brown of the other. This dichromatic coloration is also found in *Mormoops* and *Dermonotus*.

Key to the Forms.

- a.—External margin of the ear with a distinct notch at or slightly below the middle.
- b.—Internal margin of the ear basally thickened and bearing a distinct angulate notch.
- c.—External margin of the ear abruptly convex at the commencement of its lower third forming an acute-angulate notch; forearm 35–44.5 mm.
- d.—Forearm less than 43 mm. in length; cutaneous ridge surmounting the superior margin of the nostrils without a deep median emargination.
- e.—Length of head, body and tail considerably over 56 mm.; calcaneum not less, usually much more, than 18 mm. in length.
- f.—Skull rather elongate and slender; greatest zygomatic width usually less than half the total length of the skull; rostrum and brain-case about equal in length,
macleayi Gray.⁶
- ff.—Skull abbreviate; rostrum inflated; greatest zygomatic width more than half the total length of the skull; rostrum not as long as the brain-case, . . . *m. inflata* n. subsp.
- ee.—Length of head, body and tail about 56 mm.; calcaneum not over 16 mm. in length,
m. fuliginosa (Gray).
- dd.—Forearm 43 mm. or more in length; cutaneous ridge surmounting the superior margin of the nostrils with a deep median emargination, . . . *m. grisea* (Gosse).
- cc.—External margin of the ear abruptly convex at the commencement of its lower third, forming a rectangulate notch; forearm 45.7 mm., . . . *personata* Wagner.
- bb.—Internal margin of the ear not basally thickened and without a distinct angulate notch.
- c.—Nose with a comparatively high erect tubercle; tragus apically obtuse-angulate with a large accessory lobe; skull with the rostrum slender.
- d.—First lower premolar in contact with third, the second crowded out of the toothrow on the lingual side; skull with the rostrum high; foot rather slender,
parnellii (Gray).

⁶ The females of this form closely approach *m. inflata*, but the males are quite distinct.

dd.—First lower premolar not in contact with third, the second in the toothrow though usually displaced toward the lingual side; skull with rostrum of moderate height; foot rather robust.

e.—Size large, total length 83–85 mm.; skull with the rostrum rather slender, brain-case slightly depressed, *p. boothii* (Gundlach).

ee.—Size rather small, total length 74–79 mm.; skull with the rostrum somewhat bullate, brain-case evenly arched transversely,

p. portoricensis (Miller).

cc.—Nose with a low rounded tubercle; skull with the rostrum comparatively short and broad; tragus apically produced, with a slight accessory lobe.

d.—Size very large; forearm not less than 59 mm. in length; head and body not less than 72 mm.,

rubiginosa Wagner.

dd.—Size medium; forearm not more than 59 mm. in length; head and body not more than 63 mm.,

r. mexicana (Miller).

aa.—External margin of the ear without a distinct notch at or slightly below the middle, *psilotis* Dobson.

Chilonycteris macleayii Gray.

1839. *Chilonycteris MacLeayii* Gray, Ann. Nat. Hist., IV, p. 5, Pl. 1, fig. 2. September, 1839. [Cuba.]

1840. *Chilonycteris* *MacLeayii* Wagner, Suppl. Schreber's Säugthiere, I, p. 448. [Cuba.]

1840. [*Lobostoma*] *quadridentata* Gundlach, Archiv für Naturgeschichte, VI, bd. I, p. 357. [Cuba.]

1850. *Chilonycteris* *Mac-Leayii* Wagner, Abhandlungen Mathem.-Physik. Cl. Akad. Wissenschaften, München, V, p. 186. [No locality.]

1855. *Chilonycteris* *MacLeayii* Wagner, Suppl. Schreber's Säugthiere, V, p. 678. [Cuba.]

1855. *Chilonycteris* *quadridentata* Wagner, Suppl. Schreber's Säugthiere, V, p. 678. [Cuba.]

1872. *Chilonycteris MacLeayii* Peters, Monatsber. K. Preuss. Akad. Wissensch. Berlin, 1872, p. 360. [Part.] [Cuba; Jamaica; Haiti.]

1873. *Chilonycteris Mac-Leayi* Gundlach, Anales Soc. Espan. Hist. Nat., I, cuad. 3, p. 244. [Cuba.]

1878. *Chilonycteris macleayii* Dobson, Catal. Chiropt. Brit. Mus., p. 449. [Part.] [Cuba; Port au Prince, Haiti (type of *fuliginosa* Gray); Jamaica (type of *grisea* Gosse).]

1904. *Chilonycteris macleayii* Miller, Proc. U. S. Nat. Mus., XXVII, p. 342. [Guanajay and Baracoa, Cuba.]

Type Locality.—Cuba.

Distribution.—Cuba, apparently covering the greater part of the island, specimens from such extremes as Baracoa and Guanajay having been examined. Gundlach (*l. c.*), in speaking of this species, says: Very common, they frequent the houses in the country; observed also in caves, where they sleep in clusters.

General Characters.—Size rather small (for the genus); ears elongate,

sublanceolate, internal margin with a distinct submedian shoulder, external margin with a prominent submedian dentiform shoulder; nostrils surmounted by a sinuate ridge bearing a series of small pads, nostrils flanked by a subacute protuberance.

Head.—Moderately elongate; rostrum considerably depressed. Ears elongate, sublanceolate, the lower margin extending considerably forward but failing to reach the angle of the mouth; internal margin of the ear attached to the head anterior to the small eye, internal ridge distinct, arcuate, passing by a moderately rounded shoulder into the internal margin of the ear, distal two-thirds of the internal margin of the ear straight, bearing several distinct spiniform points superior to the shoulder of the internal ridge; external margin and lower margin ample, bearing a distinct acute notch at a point about opposite to the shoulder of the internal ridge, distal portion of the external margin straight, except the extreme apical portion which is gently concave; apex subfalcate, rounded. Tragus subelliptical; external margin with a slight nodular shoulder; internal margin bearing a subapical whorl-like accessory flap, which lies in a plane at right angles to the body of the tragus; apex rather narrowly rounded. Nostrils ovate, bordered by a low ridge, superior margin slightly depressed centrally and bearing six distinct sucker-like tubercles,⁷ lateral margins flanked by an erect subdentiform flap. Labial chin-lappet transverse, forming broadly rounded lobes laterally, the median portion of the inferior margin broadly and evenly concave, median portion of the lappet strongly papillose and margined superiorly by a small rounded nonpapillose area. Posterior chin-lappet slight, adpressed, rounded and consisting only of a fold of skin.

Limbs.—Forearm moderately long, rather strongly bowed in the proximal half; third digit rather short. Femora, tibiæ and feet rather slender; calcaneum very long, half again as long as the tibiæ.

Membranes and Fur.—Membranes rather heavy and leathery; transverse nerves very regularly disposed in the endopatagium and mesopatagium; propatagium large, the anterior border totally free; uropatagium very large, extending beyond the enclosed portion of tail a distance about equal to the same. Fur of moderate length, soft and silky; throat and chin with the fur floccose; endopatagium partially and slightly furred above; upper lip and muzzle with the hair bristle-like in character.

*Color.*⁸—Rufous phase: above mars-brown suffused on the back and

⁷ This character is subject to more or less variation, as in some specimens the individual character of each protuberance is lost.

⁸ From skins.

scapular region with burnt-umber, a slight silverying of pale hairs scattered irregularly; beneath uniform fawn color. Brown phase: above sepia, around the head and neck paler as there the ecru under color is very apparent; below pale isabella color, the hair seal-brown basally. Membranes ranging from vandyke-brown to almost pure black in color.

Skull.—Rather fragile in character; elongate, zygomatica not markedly expanded; brain-case considerably elevated above the moderately depressed rostrum; foramen magnum placed slightly above the basi-crana! axis. Brain-case subglobose, crests but slightly marked; auditory bullæ considerably inflated, of medium size. Rostrum rather low, of moderate length, evenly expanded; nasal depression considerably excavated and visibly compressed; palate subequal in width, moderately excavated, posterior projection extending but little beyond the major portion, the cleft narrowly rounded; pterygoids rather strongly divergent. Mandible with the ramus rather strong, ascending ramus low and comparatively weak; condyle small; coronoïd process very weak and not elevated above the condyle; angle of the mandible strongly developed and directed laterally, forming a pronounced subfalciform process. Skulls of females are considerably smaller, and have the rostral portion much more bullate than in the males, in this respect approaching the race *inflata*, from which they can, however, be separated by the slenderer skull and narrow palate.

Teeth.—Central pair of upper incisors much larger than the lateral pair, broad, cutting edge bilobate; lateral incisors with a single acute posteriorly placed cusp; upper canines conoid, very slightly diverging; first upper premolar subreniform in basal outline, the posterior portion lying against the internal border of the second premolar smaller than the anterior portion; second upper premolar with a large hastate posterior cusp, basal outline subpentagonal; first and second upper molars subquadrate, protocone and hypocone developed as low pointed cusps; third upper molar strongly transverse, protocone developed as a jagged elevation, para-hypoconoid ridge N-shaped. Lower incisors crowded, equal in size, trilobate; canines slender; first lower premolar unicuspitate, the labial face considerably excavated; second lower premolar very minute and crowded between the first and third and displaced toward the lingual face; third lower premolar unicuspitate, slightly more acute than the first premolar; molars equal in size.

Measurements.—Average of series.⁹ Total length [5] 61 mm. (59–65);

⁹ Numbers in brackets designate the number of specimens examined for that particular measurement. This is necessitated by the condition of material, as some alcoholic specimens are shriveled to such an extent that but few measurements can be taken. Figures in parentheses have their usual significance as extremes.

length of head and body [2] 41.2 (41.5–44); head [3] 16.4 (15.8–17); ear [3] 13.6 (12–16); tragus [3] 4.8 (4.5–5); forearm [10] 39 (37.5–41.5); thumb [3] 6.5 (6–7); third digit [3] 60.6 (60–62); tibia [10] 14.6 (12–16); calcaneum [2] 22.7 (22.5–23); foot [10] 8.8 (8–9.2); tail [3] 19.3 (18–20).

Total length of skull [6] 15.4 mm. (14.1–16.1); greatest zygomatic width [7] 7.7 (7.5–8); interorbital width [7] 3.2 (3–3.5); height at base of second premolar [7] 3.3 (3–3.5); height of brain-case [6] 6.1 (6–6.3); width of palatal constriction [7] 1.4 (1.3–1.5); length of palate [7] 6.5 (6–7); width of palate including teeth [7] 5.7 (5.3–6); greatest length of mandible [7] 11.1 (10–11.6).

Remarks.—This species is not liable to be confused with the other species of the genus, but its three subspecies are all, with the possible exception of *C. m. grisea*, quite closely related. From *macleayii grisea* the true *macleayii* may be separated by its smaller size and the shape of the superior margin of the nostrils; from *m. fuliginosa* the larger size and heavier build will distinguish it; from *m. inflata* the shape of the rostral portion of the skull, as well as the general slenderer character of the palate and zygomata, will serve to differentiate it.

The most striking variation exhibited by this species is the occurrence of two forms, one considerably smaller than the other. This fact was first noticed by Miller (*l. c.*), and, as he states, it appears to be independent of age or sex. The series studied, while a picked lot from the series he examined, do not give the extreme dimensions he cites, but the two forms can very readily be distinguished. Another very striking variation is in the shape of the skull, and is apparently sexual. The skulls of the females examined are shorter and more inflated in the rostral portion than those of the males. In this respect they approach the Porto Rican *m. inflata*, but the skull of that form appears, in both sexes, to be more inflated and robust proportionally than the smaller females of *macleayii*.

Specimens Examined.—Eleven alcoholic specimens and seven skins:

Guanajay, Pinar del Rio, Cuba. (U. S. N. M.) [6.]

Baracoa, Santiago, Cuba. (U. S. N. M.) [4.]

Eight miles east of Baracoa, Santiago, Cuba. (U. S. N. M.) [8.]

Chilonycteris macleayii fuliginosa (Gray).

1843. *Chilonycteris fuliginosa* Gray, Proc. Zoöl. Soc. London, 1843, p. 20.
[Haiti.]

1855. *Chilonycteris fuliginosa* Wagner, Suppl. Schreber's Säugthiere, V,
p. 679. [Haiti.]

1872. *Chilonycteris MacLeayii* Peters, Monatsb. K. Preuss. Akad. Wissensch.,
Berlin, 1872, p. 360. [Part.] [Cuba; Jamaica; Haiti.]

1878. *Chilonycteris macleayi* Dobson, Catal. Chiropt. Brit. Mus., p. 449.
[Part.] [Cuba; Port au Prince, Haiti (type of *fuliginosa* Gray); Jamaica
(type of *grisea* Gosse).]

Type Locality.—Port au Prince, Haiti.

Distribution.—The island of Haiti and San Domingo. No specimens possessing exact data available.

General Characters.—Allied to the Cuban *macleayii* but the size smallest in the genus, skull smaller than in *macleayii* and comparatively slender, and calcanea shorter.

Head.—As in *C. macleayii*.

Limbs.—Except for the generally smaller size of the forearm and tibia, no difference is noted from the same portions of *macleayii*. The calcaneum is distinctly shorter, not at all or but slightly exceeding the tibia in length.

Membranes and Fur.—As in *macleayii*.

Color.—The available alcoholic specimens have been preserved for quite a long time and the coloration exhibited by them may be somewhat abnormal. General color above cinnamon-rufous; below seal-brown; volar membranes prout's-brown; ears wood-brown. The single skin available is mummified and has been in a liquid preservative at some time; the colors are as follows: above pale mars-brown; below isabelline, becoming ecru-drab on the throat; membranes drab.

Skull.—Similar to *C. macleayii* but smaller, the males with the whole form comparatively more robust than in the same sex of *macleayii*. The singular abbreviate skull of the females of *macleayii* approaches *m. fuliginosa* very much, but the latter has a slenderer rostrum and more compressed zygomata. One specimen (5072, A. N. S. P.) bears a comparatively high sagittal crest.

Teeth.—Essentially as in *C. macleayii* with the following exceptions: first upper premolar simpler in outline, more ovate than reniform; second upper premolar more transverse in outline than pentagonal, the anterior shoulder not as strongly developed as in *macleayii*.

Measurements.—Average of series: Total length [1] 56.2 mm.; length of head and body [3] 40.5 (39.5–41); head [1] 17.1; ear [2] 13.6 (13.2–14); tragus [2] 4.5; forearm [5] 37.7 (35–40); thumb [4] 6.2 (6–7); third digit [5] 62.2 (58.5–68); tibia [5] 15.1 (14.5–16); calcaneum [2] 15 (14–16); foot [5] 8.3 (8.9); tail [5] 18.8 (17–20).

Total length of skull [2] 14.1 (14–14.3); greatest zygomatic width [1] 7.2; interorbital width [3] 3; height at base of second premolar [3] 3; height of brain-case [2] 6; width of palatal constriction [2] 1.4; length of palate [2] 6.1 (6–6.2); width of palate including teeth [3] 5.1 (5–5.2); greatest length of mandible [2] 10.5 (10–11).

Remarks.—This form of *macleayii*, while not at all sharply defined, can be recognized by the unusually small size, short calcaneum and rather different skull. In a number of characters which reach their extremes in *macleayii* and *m. inflata*, *m. fuliginosa* is intermediate, as

might be expected from the distribution of these forms; but that the three types are entitled to recognition will generally be admitted on examining representatives of the several races.

Specimens Examined.—Five, one skin and four alcoholic specimens:

Haiti. (A. M. N. H.) [1.]

San Domingo. (A. N. S. P.) [4.]

***Chilonycteris macleayii inflata* n. subsp.**

1878. *Chilonycteris Mac-Leayi* Gundlach (not of Gray), Anales Soc. Espan. Hist. Nat., VII, cuad. I, p. 140. [Bayamon and Mayaguez, Porto Rico.]

Type.—Adult ♂; Cueva di Fari, near Pueblo Viejo, Porto Rico. No. 6,234, A. N. S. Phila. March 19, 1900. Collected by Drs. C. W. Richmond and L. Stejneger.

Distribution.—Apparently the whole island of Porto Rico, specimens from a cave near Pueblo Viejo and Mayaguez having been examined.

General Characters.—This form is distinguished from true *macleayii* by the short and bullate rostrum of the skull and the rather expanded zygomata.

Head, limbs and fur very much as in *macleayii*, but the distal half of the ear is shorter and broader, the apex more blunt, and not so falcate, the external margin being straighter.

Color.—Rufous phase:¹⁰ above rather dark cinnamon; below wood-brown, the fur basally mummy-brown. Brown phase: above bistre, the short hair on the nape and sides of the neck silvery-white, the latter also apparent in the general bistre tint, caused by scattered unicolored hairs and also by the silvery median bands of the darker hairs; below with the hair basally bistre, apically drab, becoming wood-brown on the chin and throat and whitish on the abdomen. Membranes dull blackish. One specimen examined appears to be intermediate between the two phases.

Skull.—Similar to that of *C. macleayii*, but with the rostrum shorter and broader, the brain-case higher and the zygomata more expanded. The rostrum is considerably shorter than the brain-case in length and the lateral margins are rather strongly and evenly arcuate; brain-case strongly inflated and elevated above the rostrum a distance more than equal to the height of the rostrum at the anterior margin of the orbits. Palate considerably broader than in *macleayii*. The skulls of females of *macleayii* are, of course, very similar to the males of *m. inflata* in general appearance, but they lack the extreme characters of the rostrum, and the high brain-case is peculiar to *inflata*. The skull of the female of *inflata*, however, is practically indistinguishable from that of *macleayii*, though the latter is somewhat smaller.

¹⁰ Type in this phase.

Teeth.—Similar to *macleayii* but for the following exceptions: median upper incisors very broad and very distinctly bilobate; first upper premolar small and low, considerably crowded; second lower premolar shorter and broader, the basal outline more rounded and not so oblong as in *macleayii*.

Measurements.—Type: Total length 63 mm.; head and body 45.5; head 17.3; ear 12.5; tragus 4.8; forearm 38.5; thumb 7; third digit 63.5; tibia 16.5; calcaneum 18; foot 8.5; tail 18. Average of series: Total length [3] 64.3 (61.5–68.5); head and body [5] 48.7 (41–52); head [2] 16.9 (16.5–17.3); ear [2] 12.2 (12–12.5); tragus [2] 4.5 (4.3–4.8); forearm [6] 38.7 (38–40); thumb [2] 7; third digit [2] 62.2 (61–63.5); tibia [5] 15.6 (15–16.5); calcaneum [2] 19.7 (18–20.5); foot [6] 8.4 (8–9); tail [4] 19.6 (17–23).

Type skull: Total length 15.3 mm.; interorbital width 3.5; height at base of second premolar 3.5; height of brain-case 6.4; width of palatal constriction 1.5; length of palate 6; width of palate including teeth 5.5; greatest length of mandible 11. Average of series of skulls: Total length [5] 14.8 (14.2–15.3); greatest zygomatic width [3] 8 (7.9–8); interorbital width [5] 3.2 (3–3.5); height at base of second premolar [5] 3.3 (3.1–3.5); height of brain-case [5] 6.4 (6.1–7); width of palatal constriction [5] 1.4 (1.3–1.5); length of palate from anterior foramina [5] 6.1 (6–6.4); width of palate including teeth [5] 5.3 (5.1–5.5); length of mandible [5] 10.8 (10.6–11.1).

Remarks.—The foregoing description presents the differential characters of *inflata* so that no general remarks are necessary. The phyla represented by *m. fuliginosa* and *m. inflata* reaches its extreme type in the latter race, the most apparent diagnostic character of which is the inflated rostrum.

Specimens Examined.—Two alcoholics and four skins:

Cueva di Fari, near Pueblo Viejo, Porto Rico. (A. N. S. P. and U. S. N. M.) [5.]

Mayaguez, Porto Rico. (U. S. N. M.) [1.]

Chilonycteris macleayii grisea (Gosse).

- 1851. *Chilonycteris grisea* Gosse, A Naturalist's Sojourn in Jamaica, p. 326, Pl. VI, fig. 1. [Phoenix Park, Jamaica.]
- 1861. *Chilonycteris quadridens* Tomes, Proc. Zool. Soc. London, 1861, p. 65. [Oxford Cave, Jamaica.]
- 1872. *Chilonycteris MacLeayi* Peters, Monatsb. K. Preuss. Akad. Wissensch., Berlin, 1872, p. 360. (Part.) [Cuba; Jamaica; Haiti.]
- 1878. *Chilonycteris macleayi* Dobson, Catal. Chiropt. Brit. Mus., p. 449, Pl. XXIII, fig. 1. (Part.) [Cuba; Port au Prince, Haiti (type of *fuliginosa* Gray); Jamaica (type of *grisea* Gosse).]
- 1880. *Chilonycteris macleayi* Dobson (not of Gray), Rep. Brit. Asso. Adv. Sci., 1880, p. 195. [Environs of Kingston, Jamaica.]

Type Locality.—Phoenix Park, St. Ann Parish, Jamaica.

Distribution.—The island of Jamaica, specimens having been recorded from the type locality, Kingston and Oxford Cave, while other individuals have been examined from Lucea, Hanover Parish, in the extreme northwestern part of the island.

General Characters.—Size quite large, largest of the *macleayii* group; nostrils with the superior margin deeply and squarely emarginate centrally.

Head.—Similar to *C. macleayii* with the following exceptions: Nostrils with the superior margins bearing two low quadrate peg-like projections, between which is a deep emargination completely separating them; process flanking the nostrils elongate, sublanceolate in character. Dobson's figure (*vide supra*) represents these characters very clearly and was no doubt taken from the type specimen presented by Gosse, as that was the only Jamaican specimen studied by him.

Limbs.—Similar in character to *C. macleayii*, but, of course, larger, though the proportions are practically the same.

Membranes and Fur.—As in *macleayii*, but the free margin of the uropatagium very curiously tucked and thickened by short longitudinal thickenings, a character well exhibited in Gosse's original plate of the species.

*Color.*¹¹—Rufous phase: above ferruginous; below chestnut, becoming pale on the chin; ears and cephalic processes vinaceous-cinnamon, the former becoming pale drab apically; volar membranes mummy-brown. Brown phase: above bistre, sprinkled and suffused with silvery-white as in the brown phase of the other races of the *macleayii* group; beneath clove-brown; membranes as in the rufous phase.

Skull.—Elongate, somewhat compressed; rostrum slenderer, comparatively, than in any of the other forms of the *macleayii* group; brain-case moderately inflated.

Teeth.—As in *C. macleayii*, except for the first lower premolar which is broader, with the external margin more rounded than in the typical form.

Measurements.—Average of series: Total length [4] 68.7 (66.5–74); head and body [4] 45.4 (44.5–49); head [2] 18.3 (18.2–18.5); ear [4] 15.2 (14–16.3); tragus [4] 5.6 (5–6.5); forearm [4] 43.8 (43–44.5); thumb [4] 7.5 (7–8); third digit [4] 73.7 (72.5–75); tibia [4] 16.3 (16–17); calcaneum [4] 23 (20–26); foot [4] 9.7 (9.5–10); tail [4] 23.2 (22–25).

Total length of skull [2] 16.9 (16.8–17); greatest zygomatic width [2] 8 (8–8.1); interorbital space [2] 3.5; height of second premolar [2] 3.5 (3.5–3.6); height of brain-case [1] 6.3; width of palatal constriction

¹¹ From alcohol.

[2] 1.5 (1.5–1.6); length of palate from anterior foramina [2] 7; width of palate including teeth [3] 6; greatest length of mandible [2] 12 (11.9–12.1).

Remarks.—The Jamaican form of the *macleayii* group is so very distinct from the other associated races that no general summary is necessary.

Specimens Examined.—Four alcoholic specimens: Lucea, Jamaica. (A. M. N. H.)

***Chilonycteris personata* Wagner.**

- 1843. *Chilonycteris personata* Wagner, Archiv für Naturgeschichte, IX, bd. I, p. 367. [Matto Grosso.]
- 1850. *Chilonycteris personata* Wagner, Abhandlungen Mathem.-Physik. Cl. Akad. Wissenschaften, München, V, p. 185. [St. Vincent Matto Grosso.]
- 1854. *Chilonycteris personata* Burmeister, Thiere Brasiliens I, p. 76. [St. Vincent, Matto Grosso.]
- 1855. *Chilonycteris*] *personata* Wagner, Suppl. Schreber's Säugthiere, V, p. 680. [Matto Grosso.]
- 1872. *Chilonycteris personata* Peters, Monatsber. K. Preuss. Akad. Wissenschr., Berlin, 1872, p. 360. [Brazil; Venezuela; Guatemala.]
- 1878. *Chilonycteris persona'a* Dobson, Catal. Chiropt. Brit. Mus., p. 451. [Guatemala; Venezuela; Matto Grosso, Brazil.]
- 1879. *Chilonycteris personata* Alston, Biol. Cent.-Amer., Mamm., p. 35. [Guatemala; Venezuela; Brazil.]

Type Locality.—Matto Grosso, Brazil. As Wagner afterward particularly mentioned St. Vincent, Matto Grosso, it is quite probable that it was the exact locality from which the type was obtained.

Distribution.—This species has a very extensive distribution, but as specimens appear to be extremely rare and none are now at hand, the records mentioned above constitute the only information. It will be seen to range from Matto Grosso, Brazil, to Guatemala, and eastward to Venezuela.

Description.—As no specimens have been examined in this connection, Wagner's description and notes in the *München Abhandlungen (vide supra)* are here given:

“Die Beschaffenheit der Ohren, der Klappe, der Nase, des Lippenbesatzes und der Schneidezähne ist ganz dieselbe wie bei *Ch. gymnonotus*.¹² Die Sporen sind ebenfalls, aber nur sehr wenig, an den untern Theil des Schienbeins geheftet, und auch die Flügel setzen sich etwas tiefer an. Der Hauptunterschied liegt in der Behaarung, indem der Rücken bei dieser Art eben so behaart ist als der übrige Körper. Die Farbe des Pelzes kann nicht mit Sicherheit angegeben werden, da das einzige Exemplar in Brauntwein aufbewahrt ist. Sie scheint oben schwarz oder dunkelbraun zu seyn, unten lichtbraun, indem hier die Haarspitzen weit heller sind. Mit *Ch. rubiginosa* kann der verschied-

¹² This is *Dermonotus fulvus*.

enen Färbung und der geringeren Grösse wegen keine Verwechslung vor sich gehen.

Körper.....	2"	1'''	Schwanz.....	0"	7½'''
Höhe.....	1	8½	Freier Theil desselben..	0	3
Kopf	0	7	Schenkelflughaut.....	1	1
Ohrlänge.....	0	6	Vorderarm.....	1	8
Ohrbreite.....	0	4	Schienbein.....	0	7½
Sporen.....	0	10	Flugweite ohngefähr....	10	6

"Das beschriebene Exemplar, ein Männchen, röhrt von St. Vincente in der Provinz Mato grosso her. Steht mit *Ch. Mac-Leayii* in naher Verwandtschaft; wenn jedoch, wie es allen Anschein hat, *Gundlach's Lobostoma quadridens* mit der Gray'schen Art identisch ist, so ist von ihnen die unerige schon deshalb spezifisch verschieden, weil zwar die untere Hälfte des Vorderrandes des Ohrs ebenfalls erweitert ist (was mit zu den generischen Kennzeichen zu gehören scheint), aber die Erweiterung bildet nicht 4 Zähnchen, sondern ist wie bei voriger Art ganzrandig."

Chilonyceteris parnellii (Gray).

- 1843. *Phyllodia Parnellii* Gray, Proc. Zoöl. Soc. London, 1843, p. 50.
[Jamaica.]
- 1855. *Ch[ilonycteris] Parnellii* Wagner, Suppl. Schreber's Saugthiere V,
p. 680. [Jamaica.]
- 1861. *Chilonyceteris osburni* Tomes, Proc. Zoöl. Soc. London, 1861, p. 66,
Pl. XIII. [Sportsman's Cave, Jamaica.]
- 1865. *Chilonyceteris* sp. Osborn, Proc. Zoöl. Soc. London, 1865, p. 68. [Sports-
man's Hall Cave; Oxford Cave, Manchester, Jamaica.]
- 1865. *Chilonyceteris osburni* Selater, Proc. Zoöl. Soc. London 1865, p. 68,
footnote.
- 1866. *Phyllodia Parnellii* Peters, Monatsber. K. Preuss. Akad. Wissensch.,
Berlin, 1866, p. 678. [No locality.]
- 1872. *Chilonyceteris Parnellii* Peters, Monatsber. K. Preuss. Akad. Wiss-
sensch., Berlin, 1872, p. 360. (Part.) [Cuba; Jamaica.]
- 1878. *Chilonyceteris parnellii* Dobson, Catal. Chiropt. Brit. Mus., p. 452.
[Jamaica.]
- 1902. *Chilonyceteris parnellii* Miller, Proc. Acad. Nat. Sci. Phila., 1902, p. 401.

Type Locality.—Jamaica.

Distribution.—Apparently restricted to the island of Jamaica, the only definite records being from the Sportsman's Hall and Oxford Cave, while a series of specimens examined in this connection are from Lucea, Hanover Parish. Osburn (*l.c.*) has given us an interesting account of the species in captivity.

General Characters.—Size rather large; ears large, subacute; the internal margin arcuate, the external margin with a distinct submedian shoulder; tragus rounded with a distinct accessory lobe; nostrils superiorly margined by a slight cutaneous ridge; nose bearing a distinct high fleshy protuberance.

Head.—Rather elongate, depressed; rostrum rather broad. Ears large, rather broad, the lower flap broad and extending forward almost to the corner of the mouth; internal margin evenly arcuate, attached to the head above the posterior corner of the small eye, internal ridge distinct, the inferior lobe truncate; external margin of the ear basally arcuate, a distinct though slight submedian shoulder, distal half faintly arcuate with a subapical concavity which throws into relief the rather blunt though slightly recurved apex. Tragus rather short, the apex blunt and rounded, the external margin with a slight submedian shoulder; accessory lobe distinct and represented by a curved fold on the internal side parallel with, but distinct from, the main portion of the tragus. Nostrils somewhat inflated, and each surmounted and internally bordered by a low arcuate row of obscure tubercles. Lateral portions of the muzzle thickened and forming a moderately elevated ridge which gradually passes into the lateral portions of the upper lip. Rostrum surrounded by a high rounded excrescence.¹³ Labial chin-lappet rather narrow, strongly transverse, the median portion strongly papillose, the superior margin around the semicircular chin-pad bearing the largest papillæ; inferior margin very faintly concave. Posterior chin-lappet a simple flap almost equal to the labial lappet in width, depressed.

Limbs.—Forearm of moderate length, slightly curved in the proximal portion; thumb rather heavy. Tibia rather heavy and stout (for the genus); foot slender, the toes strongly compressed; calcaneum not quite half as long again as the tibia.

Membranes and Fur.—Membranes rather thin but strong, the endopatagium and mesopatagium with the nerve rami longitudinal; uropatagium moderately large and with a great number of transverse lines of hair; propatagium deep proximally, margin entirely free. Fur rather thick and rather woolly in character on the lower surface, the throat sparsely haired, the upper surface of the endopatagium with a considerable proximal area furred. Hair on the chin-lappets and muzzle rather setiform; ears with an irregular covering of white flocculose hairs.

Color.—This species appears to possess two color phases, which are not quite so clearly defined as in some of the other forms of the genus. Brown phase:¹⁴ above between clove- and vandyke-brown; below clove-

¹³ This curious outgrowth is exceedingly interesting. It is possibly analogous to the nose-leaf of the Phyllostomine bats, but this appears to be doubtful, and probably it should be considered as representing a structure similar to that found in some Vespertilionine bats such as *Antrozous* and *Corynorhinus*.

¹⁴ From alcohol.

brown, the hair with a silvery or whitish suffusion; membranes and muzzle mars-brown, the latter portion rather pale and tending toward cinnamon. Rufous phase: above dark mars-brown, the hair pale at base; below with the hair between vandyke-brown and sepia basally, the apical portion light and rather silvery in character; membranes a little paler than in the brown form.

Skull.—Robust and strongly built. Brain-case moderately elevated above the rostrum, somewhat depressed longitudinally, but rather evenly arched transversely; auditory bullæ rather prominent; zygomata little curved, simple, greatest width posterior. Rostrum rather high, appearing somewhat compressed when viewed from the anterior aspect, merging into the brain-case with a very slight angle; nasal depression slight, shallow; palate rather deeply excavated, posterior extension short and with the cleft acute-angulate. Mandible rather slender, symphysis and anterior portion heavy; ascending ramus low; angle bluntly and slightly recurved.

Teeth.—Median upper incisors quadrate in outline, very obscurely bilobate; lateral upper incisor circular in basal outline and touching the anterior margin of the incisor, cusp very low; upper canine conoid, very slightly recurved; first upper premolar reniform in basal outline, cusp rather low; second upper premolar trigonal in basal outline, cusp moderately high, caniniform, internal cingulum rather strongly marked; first and second upper molars with the proto-hypoconoid ridge well marked, the hypocone considerably the lower. Lower median incisors distinctly trilobate, laterals bilobate or obscurely trilobate, all short and rather crowded; lower canines somewhat divergent and slightly recurved; first lower premolar rather oblong in basal outline, cusp rather acute; second lower premolar small, circular and crowded between the first and third premolar and forced to the internal side of the toothrow, which when viewed from the labial aspect exhibits little or no space between the first and third premolar; third lower premolar compressed, elongate when viewed from above, the cusp erect and somewhat recurved with a slight anterior accessory cusp; lower molars similar in character to one another, the first the largest in the series, the posterior molar with the entoconid very low when compared with that cusp of the other teeth.

Measurements.—Average of series of eight alcoholic specimens: Total length 76 (73.5–81) mm.; length of head and body 56.7 (53–60.5); length of head 23.5 (22–25); length of ear 20.6 (19.5–21.5); length of tragus 5.3 (4.5–6); length of forearm 53.5 (52–54); length of thumb 8.2 (7.5–8.5); length of third digit 85.8 (84–87); length of tibia 19 (18–19.5);

length of calcaneum 23 (21–24); length of foot 12.7 (12–13.4); length of tail 20.9 (17–25).

Average of three skulls: Total length 20.6 (20.2–21); greatest zygomatic width 11.1 (11–11.5); interorbital width 4 (4–4.1); height at base of second premolar 4.9 (4.8–5); height of brain-case 7.6 (7.2–8); breadth of brain-case above roots of zygomata 10; width of palatal constriction 1.4 (1.4–1.5); length of palate from anterior foramina 8.6 (8.3–9); width of palate including teeth 7.1 (7.1–7.2); greatest length of mandible 15.5 (15.2–16.).

Remarks.—This species is not liable to be confused with any of the forms of the genus except its own subspecies. From both of these it may be separated by the crowded second premolar, the high rostral portion of the skull and the rather slender foot.

Specimens Examined.—Eight alcoholic specimens: Lucea, Jamaica. (A. M. N. H.)

***Chilonycteris parnellii boothi* (Gundlach).**

- 1861. *Chilonycteris Boothi* Gundlach, Monatsber. K. Preuss. Akad. Wissensc., Berlin, 1861, p. 154. ["In Fundador, auch in Guines."]
- 1872. *Chilonycteris Parnelli* Peters, Monatsber. K. Preuss. Akad. Wissensc., Berlin, 1872, p. 360. (Part.) [Cuba; Jamaica.]
- 1873. *Chilonycteris Boothi* Gundlach, Anales Soc. Espan. Hist. Nat., I, cuad. 3, p. 245. [Cuba.]
- 1902. *Chilonycteris boothi* Miller, Proc. Acad. Nat. Sci. Phila., 1902, p. 401.
- 1904. *Chilonycteris boothi* Miller, Proc. U. S. Nat. Mus., XXVII, p. 341. [Baracoa, Santiago, Cuba.]

Type Locality.—Fundador, Matanzas Province, Cuba. Gundlach states that the species was also found at Guines, but Fundador was fixed as the type locality by Miller and Rehn.¹⁵

Distribution.—The species has been recorded from Guines, Havana Province; Fundador, Matanzas Province, and Baracoa, Santiago Province. From these records it would appear that the species is rather generally distributed through the island. Gundlach, in speaking of the species, says: Observed and not rare in various caves of the departments, also gathering at night in houses in the country.

General Characters.—Similar to *C. parnellii*, but differing in the disposition of the lower premolars, the more depressed rostrum and the more robust form. It is also very closely related to *C. p. portoricensis*, from which, however, it is separated by its larger size, slenderer rostrum and rather depressed brain-case.

Head.—Similar to *C. parnellii*, but with the ear slenderer, longer and with the apical portion decidedly falcate.

Limbs.—Much as in *C. parnellii*, except that the foot appears to be

¹⁵ *Proc. Boston Soc. Nat. Hist.*, XXXI, p. 125.

rather stouter and heavier. As the comparable material of *C. p. boothi* is very limited, this may prove to be incorrect when a larger series is examined and compared.

Membranes and Fur.—As in *C. parnellii*.

Color.—As far as published references and available material goes, no rufous phase is known in this race. This is no doubt due to the limited material available, and further work will probably show the rufous type is also present in the Cuban form. Hair of the upper surface silvery-gray at the base, apically dark walnut-brown, rather pale on the nape and sides of the neck, where the under color shows through and considerably weakens the brown tint; below with the hair of the chest and abdomen bistre at the base, the tips of the hair on these parts and all the hair on the throat and chin ecru-drab, this color appearing stronger on the throat than on the other parts; membranes seal-brown.

Skull.—Similar to *C. parnellii*, but slightly larger, the rostrum slightly slenderer and lower, while the nasal impression is not as marked as *C. parnellii*.

Teeth.—Essentially as in *C. parnellii*, except that the second lower premolar is not as crowded, having a place in the toothrow (*i.e.*, placed so that it is distinctly visible from either the labial or lingual aspect of the tooth series), though still somewhat displaced toward the lingual side.

Measurements.—Average of a series of four specimens: Total length 81.2 (76–88); length of head and body 64.4 (60.5–68); length of head¹⁶ 24.8 (24.2–25.5); length of ear¹⁶ 22 (21.5–22.5); length of tragus¹⁶ 5.6 (5.3–6); length of forearm 52 (51–53.5); length of thumb 8.7 (8–9.1); length of third digit 86.7 (85–90); length of tibia 19.5 (19–20); length of calcaneum 21.8 (21–23); length of foot 11.6 (11–12.5); length of tail¹⁶ 21 (19.5–22.5).

Average of two skulls: Total length 21 (20.8–21.2); greatest zygomatic width 11.2 (11.2–11.3); interorbital width 4.2; height at base of second premolar 4.8; height of brain-case 7.4 (7.3–7.5); breadth of brain-case above roots of zygomata 10; width of palatal constriction 1.4 (1.3–1.6); length of palate from anterior foramina 8.7 (8.6–8.8); width of palate including teeth 7.2 (7.2–7.3); greatest length of mandible 15.7 (15.5–16).

Remarks.—The differential characters of this form have already been given under the key of the species and general characters of the race.

¹⁶ From two specimens.

Specimens Examined.—Four specimens, two skins, two alcoholic individuals: Baracoa, Santiago, Cuba. (U. S. N. M.)

***Chilonycetes parnellii portoricensis* (Miller).**

1902. *Chilonycetes portoricensis* Miller, Proc. Acad. Nat. Sci. Phila., 1902, p. 400. [Cave near Pueblo Viejo, Porto Rico.]

Type Locality.—Cueva di Fari, near Pueblo Viejo, Bayamon district, Porto Rico.

Distribution.—Known only from the type locality, but probably found in suitable localities throughout the island.

General Characters.—Similar to *C. p. boothi*, but the size is less, while the skull is somewhat inflated.

Head.—Essentially as in *C. p. boothi*, except that the ears appear to be slightly smaller with the apical portion blunter and less falcate.

Limbs.—Except for the slight difference in proportions, essentially as in *C. p. boothi*.

Membranes and Fur.—As in *C. p. boothi*.

Color.—Above dark brown, between Ridgway's mars-brown and bistre, pale on the nape where the ecru-drab under portion of the hair is very evident; below dark gray, the base of the hair on the abdomen and chest seal-brown, on the throat and chin pale isabella color; membranes blackish-brown. The remarks made under *C. p. boothi* concerning color phases also apply to this form. One specimen shows a slight approach toward the rufous form.

Skull.—Similar to that of *C. p. boothi*, except that the brain-case is more arched transversely and the rostrum is distinctly broader and heavier. This character is interesting, as it is paralleled by a similar development in the Porto Rican form of the *macleayii* group.

Teeth.—Essentially as in *C. p. boothi*.

Measurements.—Average of series: Total length [5] 77.3 (74–79); length of head and body [5] 57.8 (54–66); length of head [4] 23 (21.5–24.3); length of ear [4] 20.5 (19.7–22); length of tragus [4] 5.3 (5–5.7); length of forearm [5] 50.7 (49.6–51.5); length of thumb [5] 8.2 (8–8.5); length of third digit [5] 81 (79–82); length of tibia [5] 18.4 (18–19); length of calcaneum [4] 22.9 (19–25); length of foot [5] 11.8 (10.5–12.5); length of tail [4] 21 (19.5–23).

Dimensions of one skull: Total length 20.5; greatest zygomatic width 11.1; interorbital space 4; height at base of second premolar 4.8; height of brain-case 7.5; breadth of brain-case above roots of zygomata 9.8; width of palatal constriction 1.4; length of palate from anterior foramina 8.7; width of palate including teeth 7.5; greatest length of mandible 15.6

Remarks.—This race needs special comparison with only one form, *C. parnellii boothi*. From it *portoricensis* can be distinguished by the rather smaller size and the form of the skull. The ears do not seem to be as good a diagnostic character as those given here, but still there is a slight difference in the shape of the same. From *C. parnellii* the same characters that distinguish *C. p. boothi* can be applied to this subspecies.

Specimens Examined.—Five, one skin, four alcoholic specimens: Cueva di Fari, near Pueblo Viejo, Porto Rico. (U. S. N. M.)

***Chilonycteris rubiginosa* Wagner.**

1843. *Chilonycteris rubiginosa* Wagner, Archiv für Naturgeschichte, IX, bd. I, p. 367. [Caiçara, Brazil.]
1850. *Chilonycteris rubiginosa* Wagner, Abhandlungen Mathem.-Physik. Cl. Akad. Wissenschaften. München, V, p. 181, taf. III, figs. 2-6. [Caiçara, Brazil.]
1854. *Chilonycteris rubiginosa* Burmeister, Thiere Brasiliens, I, p. 75. [Caiçara, Brazil.]
1855. *Ch[ilonycteris] rubiginosa* Wagner, Suppl. Schreber's Säugthiere, V, p. 679. [Matto Grosso.]
1872. *Chilonycteris rubiginosa* Peters, Monatsberichte K. Preuss. Akad. Wissensh., Berlin, 1872, p. 360. [Brazil; Guatemala; Costa Rica.]
1878. *Chilonycteris rubiginosa* Dobson, Catal. Chiropt. Brit. Mus., p. 452, Pl. XXIII, fig. 3.
1879. *Chilonycteris rubiginosa* Alston, Biol. Cent.-Amer., Mamm., p. 35. (Part.) [Mirador, Mexico; Dueñas, Ciudad Vieja, Guatemala; Costa Rica; Colombia; Brazil.]
1892. *Chilonycteris rubiginosa* Thomas, Journal Trinidad Field Naturalists' Club, I, p. 162. [Port of Spain, Trinidad.]
1902. *Chilonycteris rubiginosa* Miller Proc. Acad. Nat. Sci. Phila., 1902, p. 402. [Chontales, Nicaragua; Trinidad.]

Type Locality.—Caiçara, upper Amazon, Brazil.

Distribution.—Upper Amazon region of Brazil, north to Guatemala, east at least to Trinidad. The specimens from the latter island may, when further material has been examined, prove to be a distinct race. This form no doubt intergrades with *C. r. mexicana*, as specimens of the latter race from southern Mexico approach true *rubiginosa* in proportions. The specimen from Guatemala measured by Dobson (*l. c.*) was without doubt true *rubiginosa*.

General Characters.—Size large (largest in the genus); ears with the internal margin entire; tragus apically produced and with a slight accessory lobe; nose with a low rounded tubercle.

Head.—Moderately long, depressed; crown moderately elevated above rostrum. Ears erect, apically acute; internal margin evenly arcuate, the inferior lobe rectangulate; external margin slightly concave in its upper half, median notch rectangulate, rather small, the angle of the inferior shoulder rounded, lower portion of the external margin evenly rounded and carried forward to near the angle of the

mouth, at which point it rather abruptly and squarely terminates. Tragus sublanceolate; apex acutely produced; external margin evenly rounded, with a slight emargination and thickening of the proximal portion; internal margin thickened and bearing a slight accessory lobe, which takes the form of a subarcuate longitudinal thickening of the internal margin. Nose, a distance back from the nostrils, with a rather low, rounded, subtransverse excrescence, anterior from which extend three impressed lines, the lateral ones strong, extending down to and flanking the nostrils, median one fainter and dividing the nostrils. Nostrils subovate, each crowned by a very low transverse fleshy ridge, each bearing several very poorly defined flat disk-like structures; median line between the nostrils flanked by a row of several indistinct nodular processes. Labial chin-lappet strongly transverse, arcuate; lateral portions without papillæ; median portion strongly and very distinctly papillose, and margined superiorly by a semicircular unimpressed area. Posterior chin-lappet a simple adpressed fold half the width of the labial chin-lappet.

Limbs.—Forearm moderately long, slightly and evenly bowed; third digit of medium length. Forearm, tibiæ and feet rather robust, the toes occupying about half the length of the foot; calcaneum rather short, exceeding the tibiæ by a fifth the length of the latter.

Membranes and Fur.—Membranes leathery, but not heavy; veins of the endopatagium and mesopatagium regularly longitudinal, those of uropatagium irregularly radiating from the point of exit of the tail; uropatagium large; propatagium deep, free its entire length. Fur uniformly distributed over the body, and extending a moderate distance on the endopatagium, both above and below; hair around the muzzle rather setiform in character.

*Color.*¹⁷—Above mars-brown, with a slight hoary frosting posteriorly; below prout's-brown posteriorly suffused with pale ochraceous. Membranes sepia. The red phase is also present in this species, as both Wagner and Dobson mention it.

Wagner possessed two specimens, one in each phase. He describes the red phase as follows: The color of the upper and the under side is a uniform rusty cinnamon-red, that of the upper side of the body by the nape and the breast brighter, on the belly lighter with scattered spots of light brown. On the upper side the hair is unicolor for its entire length; on the belly the greater under part is dark with lighter tips. The flying membranes are brownish, the nails of the hind foot soiled horn-brown. The second example is a dark color.

¹⁷ From one Nicaragua skin.

Skull.—Rather strongly built; moderately elongate, zygomata but little expanded; brain-case moderately elevated above the short and broad rostrum. Brain-case subglobose, somewhat depressed, crests faint. Rostrum of medium height, comparatively short and distinctly expanded, considerably less than the brain-case in length; nasal depression distinctly though shallowly excavated; palate subequal in width, moderately excavated, posterior projection extending but little beyond the major portion, the cleft narrowly rounded; pterygoids considerably divergent. Mandible with the ascending rami low and quite weak, the angle being considerably elevated and moderately produced laterally.

Teeth.—Median upper incisors moderately large, shallowly bilobate, the external lobe considerably smaller than the internal; external upper incisors over half the size of the median pair in basal outline, the cusp very low and weak, no space present between the incisors and canines; upper canines very slightly divergent and moderately recurved; first upper premolar reniform in basal outline, the greatest length of the tooth oblique, cusp low and simple; second upper premolar crudely triangular in basal outline, the apex anterior, cusp caniniform; first and second upper molars with the protocone and hypocone distinct and acute. Lower median incisors trilobate; lower lateral incisors bilobate, not half the size of the median pair and crowded between them and the canines; lower canines considerably divergent, slightly recurved; first lower premolar subquadrate in basal outline, cusp moderately elevated, compressed; second lower premolar low, circular and strongly crowded between the first and third premolar; third lower premolar oblong in basal outline, the single cusp acute; third lower molar smaller than the two preceding teeth and the entoconid and hypoconid somewhat weaker when compared with the para Proto-metaconid group.

Measurements.—Averages of series: Length of head and body [3] 67.5 mm. (62.5–72); total length [4] 89 (80–95); length of head [3] 25.3 (24–26.1); ear [3] 21.5 (21–22); tragus [3] 5.7 (5.5–6); forearm [4] 60.6 (59–63); thumb [3] 10.7 (10.3–11.5); third digit [3] 96.6 (92–101); tibia [4] 22.1 (22–22.5); foot [3] 14.5 (14–15); tail [3] 24.9 (23–26).

Total length of skull [averages from two skulls] 22.7 mm. (22.5–23); greatest zygomatic width 12.9 (12.5–13.3); breadth of brain-case above roots of zygomata 11.2 (11–11.5); interorbital width 5; height at base of second premolar 5.4 (5.3–5.5); height of brain-case 8.5; width of palatal constriction 1.8 (1.7–2); length of palate from anterior foramina 9.7 (9.6–9.8); width of palate including teeth 8; greatest length of mandible 17.8.

Remarks.—This species is unlikely to be confused with any form of the genus except the race *mexicana*, which can readily be separated by the size and the intensity of the coloration in the brown phase. From the *boothi* group it can readily be separated by the characters given in the key of species.

Specimens Examined.—Four, one skin and three alcoholic individuals:

Port of Spain, Trinidad. (U. S. N. M.) [2.]
Costa Rica. (U. S. N. M.) [1.]
Chontales, Nicaragua. (U. S. N. M.) [1.]

***Chilonycteris rubiginosa mexicana* (Miller).**

1879. *Chilonycteris rubiginosa* Alston, Biol. Cent.-Amer., Mamm., p. 35. (Part.) [Mirador, Mexico; Dueñas, Ciudad Vieja, Guatemala; Costa Rica; Colombia; Brazil.]
1894. *Chilonycteris rubiginosus* J. A. Allen. Bull. Amer. Mus. Nat. Hist., VI, p. 247. (Not of Wagner.) [South shore of Lake Chapala, Michoacan, Mexico.]
1902. *Chilonycteris mexicana* Miller, Proc. Acad. Nat. Sci. Phila., 1902, p. 401. [San Blas, Tepic; Hacienda Magdalena, near city of Colima, Colima; Chacala, Durango; Ameca, Bolaños, Jalisco; near Ometepec, Guerrero; Morelos; Huiltepec, Oaxaca; Mexico.]

Type Locality.—San Blas, Tepic, Mexico.

Distribution.—Specimens have been examined from localities reaching from Tehuantepec and Huiltepec, Oaxaca to Chacala, Durango, while individuals from Mirador, Vera Cruz, are perfectly typical. To the south, no doubt, this form grades into true *rubiginosa*, as the specimens from southern Mexico average larger than those from around the type locality.

Miller says of this form: "At San Blas *Chilonycteris mexicana* was very common in a small narrow cave which extended like a deep crevice into the base of the cliff on the hillside facing the town."

General Characters.—Similar to *C. rubiginosa* but smaller, and the brown phase of coloration lighter.

Limbs.—As in *rubiginosa*, but for the smaller size.

Membranes and Fur.—As in *rubiginosa*.

Color.—Brown phase: above prout's-brown, rather pale on the nape; below with the hair seal-brown basally with broccoli-brown tips, the color weak on the throat due to the thinner character of the pelage. Ears and membranes clove-brown.

Rufous phase: entire body and head rich tawny-ochraceous, the hairs of the under surface brown at base (varying from cinnamon on the throat to mummy-brown on the abdomen). Ears and membranes clove-brown.

The two color phases appear to run together as several specimens examined are almost intermediate, for while the upper surface will incline toward the brown phase, the lower surface strongly resembles the rufous form. The type, described by Miller, apparently does not represent the extreme of the brown phase. From the specimens examined the brown phase may be said to be commoner than the rufous form.

Skull and Teeth.—Except for the difference in size, the skull and teeth are as in *Ch. rubiginosa*.

Measurements.—Average of representative series of fourteen specimens: Total length 78.8 (77–85); length of head and body 58.8 (56.5–63.5); length of head 23.6 (22.5–24.5); length of ear 20.5 (18.5–22.1); length of tragus 5.8 (5–6.4); length of forearm 56.5 (54–59); length of thumb 9.8 (9.1–11); length of third digit 93 (87–97); length of tibia 20.2 (19–22); length of foot 12.9 (12.5–13.5); length of tail 21.2 (19.4–23.5).

Average of eleven skulls: Greatest length 21.2 (20.9–22); greatest zygomatic width 11.8 (11–12.5); interorbital width 4.4 (4.2–4.8); breadth of brain-case above roots of zygomata 10.3 (10.1–10.5); height at base of second premolar 4.8 (4.6–5.1); height of brain-case 8 (7.8–8.2); width of palatal constriction 1.6 (1.4–1.8); length of palate from anterior foramina 8.5 (8.3–9.2); width of palate including teeth 7.4 (7–7.9); greatest length of mandible 15.8 (15.4–16.5).

Remarks.—This race can easily be distinguished from true *rubiginosa* by the difference in size.

Specimens Examined.—Forty-six specimens; eight skins, thirty-six alcoholic individuals, one odd skull:

- Near Tehuantepec, Oaxaca, Mexico. (Biological Survey.) [1.]
- Huiltepec, Oaxaca, Mexico. (Biological Survey.) [1.]
- Ometepec, Guerrero, Mexico. (Biological Survey.) [3.]
- Morelos, Mexico. (U. S. N. M.) [4.]
- Mirador, Vera Cruz, Mexico. (U. S. N. M.) [1.]
- Colima City, Colima, Mexico. (Biological Survey.) [2.]
- Hacienda Magdalena, Colima, Mexico. (Biological Survey.) [5.]
- Ameca, Jalisco, Mexico. (Biological Survey.) [5.]
- Bolaños, Jalisco, Mexico. (Biological Survey.) [4.]
- South shore of Lake Chapala, Michoacan, Mexico. (A. M. N. H.) [4.]
- San Blas, Tepic, Mexico. (Biological Survey.) [11.]
- Chacala, Durango, Mexico. (Biological Survey.) [5.]

Chilonycteris psilotis Dobson.

1878. *Chilonycteris psilotis* Dobson, Catal. Chiropt. Brit. Mus., p. 451 Pl. XXIII, fig. 2.

1902. *Chilonycteris psilotis* Miller, Proc. Biol. Soc. Wash., XV, p. 249. December 16, 1902. [Isthmus of Tehuantepec, Mexico.]

Type Locality and Distribution.—Dobson's types (σ and φ) came from an unknown locality, and until the recent record of the species by Miller (*vide supra*) nothing was known regarding its habitat. The Isthmus of Tehuantepec is accordingly the only locality from which the species is known.

General Characters.—Size medium; ear without distinct notch on the external margin; toes distinctly longer than the remainder of the foot.

Head.—Rather short and broad; rostrum moderately depressed, bearing on its superior aspect a distance back of the nosa a transverse, arcuate fleshy ridge, equal in width to the nose-pad itself. Ears moderately elongate, rather broad (for the genus), apically sublanceolate, the lower margins extended considerably forward, but failing to reach the angle of the mouth; internal margin of the ear attached to the head superior to the eye, internal ridge distinct, thickened, slightly arcuate, evenly rounded inferiorly and passing by a well-marked shoulder into the internal margin of the ear, distal two-thirds of the internal margin arcuate, slightly sinuate toward the apex and furnished about half-way between the apex and the shoulder of the internal ridge with a series of four small tooth-like projections; external margin basally convex, apically concave, without any distinct notch; apex rather slender, subfalciform, narrowly rounded. Tragus oblong, apex rather acute, accessory flap small and rounded. Nostribs transversely ovate, superior margin with a rather low ridge which is divided into about six parts by shallow incisions, lateral margins flanked by low rounded fleshy folds. Labial chin-lappet strongly transverse, bearing a raised margin laterally; inferior margin very broadly and slightly concave, median portion of the lappet with rather obscure papillæ; superior margin with a deep median emargination, which lodges the simple lip-pad. Posterior chin-lappet slight, a simple fold equal in width to the labial fold, against which it is closely set.

Limbs.—Forearm moderately long, considerably bowed in the proximal half. Femora and tibiæ moderately robust (for the genus); foot elongate, somewhat compressed, considerably more than half the length of the foot occupied by the toes; calcanea but slightly longer than the tibiæ and provided with a free apex.

Membranes and Fur.—Membranes thin and rather papery in character; transverse nerves of the endopatagium and mesopatagium very regularly disposed; propatagium much as in *macleayii*, but the distal portion is rather narrower; uropatagium rather large, extending beyond the enclosed portion of the tail a distance equal to the same. Fur of moderate length and extending evenly a short distance out on the dorsal surface of the endopatagium; both surfaces of the endopatagium and uropatagium with scattered inconspicuous hairs; muzzle with a number of long setiform hairs.

Color.—As the only available specimen is an old alcoholic individual, the colors are possibly not what might be seen in fresh specimens. Above vandyke-brown, rather pale on the loins; beneath drab, with a clouding of pale whitish. Muzzle, naked spots on head and ears wood-brown, the latter rather darker than the other portions. Membranes mummy-brown, paler on the propatagium, proximal portions of the endopatagium and uropatagium than on the remaining sections. Dobson describes the color as follows: "Fur orange above and beneath with orange-brown extremities; darker above, paler beneath."

Skull.—Comparatively short and robust, the rostral portion moderately inflated and the nasal depression rather broadly and deeply excavated. Brain considerably inflated and moderately elevated above the rostrum, into which it evenly descends, crests hardly visible; zygomata moderately expanded; interorbital constriction not strongly marked. Palate subequal in width (not including teeth), moderately arched, posterior projection of little extent, the cleft obtuse-angulate; pterygoids strongly divergent. Mandible very similar to that of *C. macleayii*, but the length is less, the build heavier and the angle distinctly falcate.

Teeth.—Upper median incisors broad, rather faintly bilobate; lateral upper incisors small and closely pressed to the median pair and separated from the canines by a considerable space; upper canines moderately long, very slightly curved; first upper premolar oblong in basal outline, longitudinal disposed and bearing a single low cusp; second upper premolar subpentagonal in basal outline, the single cusp acute and subcaniniform; first and second upper molars with the hypoconid region developed into a rather projecting rounded lobe which is very apparent. Lower incisors small, trifid; lower canines straight; first lower premolar subrotundate in basal outline with the cusp rather blunt; second lower premolar minute and displaced to the inner side of the toothrow; third lower premolar subquadrate in basal outline; lower molars very much as in *C. macleayii*.

*Measurements.*¹⁸—Total length 62 mm.; head and body 46; ear (from meatus) 15.8; tragus 5; forearm 44; thumb 8; third digit 71; tibia 17; calcaneum 19; foot 9 (8); tail 16.

Total length of skull 15 mm.; greatest zygomatic width 8.2; interorbital width 3.7; height at base of second premolar 4; height of braincase 6.5; width of palatal constriction 1.2; length of palate 6; width of palate including teeth 5.5; greatest length of mandible 10.5.

Remarks.—This species hardly requires comparison with any in the genus, being smaller and differing in general aspect from the *boothi* and *rubiginosa* group, while the *macleayii* type may easily be separated by the form of the ear. The skull closely resembles that of *Dermonotus*, but it is slenderer with a narrower interorbital region and different shaped premolars. As the species seems to approach *Dermonotus* in some characters, I have placed it at the end of the genus, all the other forms appearing to be more homogeneous, a fact rather strongly demonstrated by the form of the skull.

Specimens Examined.—One alcoholic; Isthmus of Tehuantepec, Mexico. (U. S. N. M.)

¹⁸ As some measurements of the only available specimen have already been published by Miller (*l. c.*), I have used his information, only filling out the proportions required to make the measurements uniform with those of the remainder of this paper.